What is claimed is:

1. A receiver apparatus provided with a smart antenna capable of adjusting its directivity by making use of a plurality of antenna elements, said receiver apparatus comprising:

a plurality of Fourier transformation sections which are connected to said plurality of antenna elements and configured to output signals carried on sub-carriers orthogonal to each other from signals received by each of said antenna elements;

an antenna weight calculation unit which is connected to said Fourier transformation sections and configured to extract the said signals carried on pilot sub-carriers of said sub-carriers from the output signal of said Fourier transformation sections and calculate an antenna weight of each antenna elements corresponding to each of sub-carrier groups, each sub-carrier group includes a plurality of the sub-carriers whose center frequencies are located in the vicinity of the center frequency of one of pilot sub-carrier;

a plurality of weighting units which are connected to said antenna weight calculation unit and said Fourier transformation unit and configured to weight the signals of said sub-carrier groups respectively with the antenna weights as calculated by means of said antenna weight group calculation unit; and

an adder circuit which is connected to said weighting units and configured to add together the signals of said sub-carrier groups as weighted with said antenna weights for each of said antenna elements.

2. A receiver apparatus provided with a smart antenna capable of adjusting its directivity by making use of a plurality of antenna elements, said receiver apparatus comprising:

a plurality of Fourier transformation sections which are connected to said plurality of antenna elements and configured to output signals carried on

sub-carriers orthogonal to each other from signals received by each of said antenna elements;

a plurality of parallel-to-serial conversion sections which are connected respectively to said Fourier transformation sections and configured to perform parallel-to-serial conversion of the signals carried on said sub-carriers as Fourier transformed in a time division manner;

a pilot signal extraction unit which intermittently extracts signals carried on pilot sub-carriers having a predetermined center frequencies from the output signals of said parallel-to-serial conversion section;

an antenna weight calculation unit which is connected to said Fourier transformation sections and said pilot signal extraction unit and configured to calculate an antenna weight of each antenna elements corresponding to each of sub-carrier groups by the use of the signals carried on said pilot sub-carriers as extracted by said pilot signal extraction unit, each sub-carrier group includes a plurality of the sub-carriers whose center frequencies are located in the vicinity of the center frequency of one of pilot sub-carrier;

a plurality of weighting units which are connected to said parallel-to-serial conversion section and said antenna weight group calculation unit and configured to multiply the output signals of said parallel-to-serial conversion section with said antenna weights as calculated by said antenna weight group calculation unit for each of the sub-carrier groups; and

an adder circuit which is connected to said weighting units and configured to add together the signals of said sub-carrier groups as weighted with said antenna weights for each of said antenna elements.

3. A receiver apparatus provided with a smart antenna capable of adjusting its directivity by making use of a plurality of antenna elements, said receiver apparatus comprising:

a plurality of weighting units which are connected to said antenna weight calculation unit and said antenna elements respectively and configured to weight the signals received by said antenna elements respectively with predetermined antenna weights;

an adder circuit which is connected to said weighting units and configured to add together the output signals of said weighting units;

a Fourier transformation section which is connected to said adder circuit and configured to output signals carried on sub-carriers orthogonal to each other;

a pilot signal extraction unit which is connected to said Fourier transformation section and configured intermittently extract signals carried on pilot sub-carriers cyclicly appearing on the output signals of said Fourier transformation section; and

an antenna weight calculation unit which is connected to said Fourier transformation unit and said weighting units and configured to receive said signals carried on said sub-carriers, calculate antenna weights corresponding respectively to said antenna elements to form an antenna directivity pattern and output said antenna weights to said weighting units.

4. A method of receiving radio frequency signals by the use of a smart antenna capable of adjusting its directivity by making use of a plurality of antenna elements, said method comprising:

a step of calculating antenna weights with reference to predetermined pilot sub-carrier signals which are extracted from the received signal as Fourier transformed;

a step of weighting the signals as Fourier transformed with said antenna weights in order that a group of the sub-carrier signals is weighted with common antenna weights as calculated with reference to at least one pilot sub-carrier signals belonging to said group.

5. A method of receiving radio frequency signals by the use of a smart antenna capable of adjusting its directivity by making use of a plurality of antenna elements, said method comprising:

a step of intermittently extracting pilot sub-carrier signals from a serial signal containing a time series data sequence as Fourier transformed;

a step of calculating antenna weights for each of sub-carrier groups with reference to a pilot sub-carrier signal of said pilot sub-carrier signals which belong to said each of sub-carrier group; and

a step of weighting said serial signal containing a time series data sequence by timely switching said antenna weights corresponding to said sub-carrier group.

6. A method of receiving radio frequency signals by the use of a smart antenna capable of adjusting its directivity by making use of a plurality of antenna elements, said method comprising:

a step of weighting signals separately received by said antenna elements respectively with antenna weights;

a step of intermittently extracting pilot sub-carrier signals from a serial signal containing a time series data sequence as Fourier transformed; and

a step of calculating antenna weights for said respective antenna elements with reference to said pilot sub-carrier signals as intermittently extracted.

7. A beam formation circuit comprising:

an input section which is configured to receive signals as digitized after received by antenna elements respectively;

a pilot signal extraction unit which is connected with said input section and configured to intermittently extract pilot sub-carrier signals from said signals received through said input section;

an antenna weight calculation unit which is connected to said pilot signal extraction unit and configured to calculate an antenna weight of each antenna

elements corresponding to each of sub-carrier groups, each sub-carrier group includes a plurality of the sub-carriers whose center frequencies are located in the vicinity of the center frequency of one of said pilot sub-carrier;

a plurality of weighting units which are connected to said antenna weight calculation unit and said antenna elements respectively and configured to weight the signals received by said antenna elements respectively with said antenna weights as calculated by said antenna weight group calculation unit;

an adder circuit which is connected to said weighting units and configured to add together the signals of said sub-carrier groups as weighted with antenna weights for each of said antenna elements; and

a timing controlling unit which is connected to said pilot signal extraction unit and said antenna weight group calculation unit and configured to supply timing signals to said pilot signal extraction unit and said antenna weight group calculation unit.

8. A receiver apparatus for a wireless communication system on the basis of an orthogonal frequency division multiplexing modulation making use of a plurality of sub-carriers orthogonal to each other in a frequency domain, said receiver apparatus comprising:

a plurality of antenna elements which are configured to separately receive OFDM signals as modulated in accordance with said orthogonal frequency division multiplexing modulation;

a plurality of Fourier transformation circuits which are connected respectively to said plurality of antenna elements and configured to perform Fourier transformation of said OFDM signals as received by each of said antenna elements and output signals carried on said sub-carriers;

an antenna weight calculation unit which is connected to said Fourier transformation circuits and configured to receive the signals carried on said

sub-carriers and calculate antenna weights corresponding respectively to said antenna elements to form an antenna directivity pattern; and

a plurality of weighting units which are connected to said antenna weight calculation unit and said Fourier transformation unit and configured to weight the output signals of said Fourier transformation unit corresponding to the OFDM signals received by said antenna elements on the basis of said antenna weights as calculated by means of said antenna weight calculation unit,

wherein the output signals corresponding to a plurality of said sub-carriers are weighted with a common antenna weight for each of said antenna elements.

9. The receiver apparatus as claimed in claim 8 wherein said weighting units which is configured to receive the signals on said sub-carriers as output from said Fourier transformation circuits in parallel and weight the parallel signals as output from said Fourier transformation circuits in parallel.

10. The receiver apparatus as claimed in claim 8 wherein said weighting units and said Fourier transformation circuits are connected through an P/S converter which is configured to convert the parallel signals output from said Fourier transformation circuits to serial signals and transfer said serial signals to said weighting units in a time division manner.

11. The receiver apparatus as claimed in claim 8 wherein said antenna elements and said Fourier transformation circuits are connected through high frequency wave reception circuits which are configured to perform orthogonally demodulation of said OFDM signal as received by said antenna elements and transfer said OFDM signal as orthogonally demodulated to said Fourier transformation circuits.

12. The receiver apparatus as claimed in claim 11 wherein said high frequency wave reception circuits and said Fourier transformation circuits are connected through an

A/D converters which is configured to convert the analog signals output from said high frequency wave reception circuits to digital signals and transfer said digital signals to said Fourier transformation circuits.

13. The receiver apparatus as claimed in claim 12 wherein said A/D converters and said Fourier transformation circuits are connected through an S/P converter which is configured to convert the serial signals output from said A/D converters to parallel signals and transfer said parallel signal to said Fourier transformation circuits.

14. The receiver apparatus as claimed in claim 8 further comprising a circuit which is connected to said weighting units and configured to perform addition operation of the signals output from said Fourier transformation circuits and correspondingly weighted to form an antenna directivity pattern.

15. A receiver apparatus for a wireless communication system on the basis of an orthogonal frequency division multiplexing modulation making use of a plurality of sub-carriers orthogonal to each other in a frequency domain, said receiver apparatus comprising:

a plurality of antenna elements which are configured to separately receive OFDM signals as modulated in accordance with said orthogonal frequency division multiplexing modulation;

a plurality of weighting units which are connected to said antenna elements and configured to weight the OFDM signals received by said antenna elements;

a Fourier transformation circuit which is connected to said weighting units and configured to perform Fourier transformation of said OFDM signals as weighted by means of said weighting units and output signals carried on said sub-carriers; and

an antenna weight calculation unit which is connected to said Fourier transformation unit and said weighting units and configured to receive said signals carried on said sub-carriers as Fourier transformed by said Fourier transformation

circuit, calculate antenna weights corresponding respectively to said antenna elements to form an antenna directivity pattern and output said antenna weights to said weighting units,

wherein the OFDM signals corresponding to a plurality of said sub-carriers are weighted with a common antenna weight for each of said antenna elements.

16. The receiver apparatus as claimed in claim 15 wherein said antenna weight calculation unit calculates said antenna weights by switchingly giving a plurality of sets of the antenna weights to the antenna elements and comparing a plurality of antenna directivity patterns as calculated from the signals on the sub-carriers as output to determine the antenna weights of an optimal one of the antenna directivity patterns.

17. The receiver apparatus as claimed in claim 15 wherein said weighting units and said Fourier transformation circuits are connected through a circuit which is configured to perform addition operation of said OFDM signals as received by said antenna elements and weighted by said weighting units and transfer the result of the addition to said Fourier transformation circuits.

18. The receiver apparatus as claimed in claim 15 wherein said addition circuit and said Fourier transformation circuits are connected through an S/P converter which is configured to convert the serial signals output from said addition circuit to parallel signals and transfer said parallel signal to said Fourier transformation circuits.

19. The receiver apparatus as claimed in claim 15 further comprising an P/S converter which is connected to said Fourier transformation circuit and configured to convert the parallel signals as output from said Fourier transformation circuits to serial signals.